DEPARTMENT OF ELECTRICAL AND COMPUTER ENGINEERING
COURSE SYLLABUS

EE 300: Analytical Methods in Engineering

COURSE TITLE	*CODE & NUMBER*	*SUBJECT AREA*	**Contact Hours**			**Credit Units**
			Th.	***Pr.***	***Tr.***	
Analytical Methods in Engineering	**EE 300**	Math & Basic Sciences	3	1		3
Pre-requisites:	MATH 207					
Course Role in Curriculum *(Required/Elective):*	Required Course					
Catalogue Description: Linear algebra: matrices and determinants, eigenvalues and eigenvectors. Complex analysis: complex arithmetic, complex algebra, power series, differentiation and integration in the complex plane and residue analysis.						

***Textbooks*:** *(Author, Title, Pub., year)*
E. Kreyzig, *Advanced Engineering Mathematics*, 10th Ed, Wiley, 2016.

***Supplemental Materials*:**
1. Peter V.O'Neil, *Advanced Engineering Mathematics*, 6th Ed, Thomson
2. D. Zill and P. Shanahan, *Complex Analysis*, Jones and Bartlett, 2003.

***Course Learning Outcomes*:**

By the completion of the course the students should be able to:

1. Manipulate complex numbers in different basic mathematical operations.
2. Evaluate complex functions (polynomials, exponentials, sinusoidal, hyperbolic), and solve equations involving such functions.
3. Test functions for differentiability and evaluate the derivative of analytic functions.
4. Develop power series (Taylor, Mclaurin, Laurent) of complex functions
5. Evaluate integrals over open and closed curves in the complex plane.
6. Use the method of residues in evaluating complex integrals
7. Review the concepts and operations for matrix inverses and determinants.
8. Compute matrix eigenvalues and their associated eigenvectors for general matrices and triangular matrices.

Topics to be Covered:		***Duration in Weeks***
1.	Complex numbers and operations	2.0
2.	Special complex functions	1.5
3.	Complex derivatives	1.5
4.	Various types of series: power, Taylor, and Laurent	1.5
5.	Integration in the complex plane	2.0
6.	Residue integration and its applications	2.0
7.	Basic concepts, properties, and algorithms of matrices, their inverses and algorithms of matrices, their inverses and determinants. Vector spaces.	2.0
8.	Eigenvalues and eigenvectors and their applications.	1.5

Key Student Outcomes addressed by the course: (Put a ✓ sign)

(1)	An ability to identify, formulate, and solve complex engineering problems by applying principles of engineering, science, and mathematics	✓
(2)	An ability to apply the engineering design to produce solutions that meet specified needs with consideration of public health, safety, and welfare, as well as global, cultural, social, environmental, and economic factors	
(3)	An ability to communicate effectively with a range of audiences	
(4)	An ability to recognize ethical and professional responsibilities in engineering situations and make informed judgments, which must consider the impact of engineering solutions in global, economic, environmental, and societal contexts	
(5)	An ability to function effectively on a team whose members together provide leadership, creates a collaborative and inclusive environment, establish goals, plan tasks, and meet objectives	
(6)	An ability to develop and conduct appropriate experimentation, analyze and interpret data, and use engineering judgment to draw conclusions.	
(7)	An ability to acquire and apply new knowledge as needed, using appropriate learning strategies	

Instructor or course coordinator: Dr Hatem Rmili
Last updated: Spring 2020